



IB MYP YEAR 5 ASSESSMENT TASK A Broad-based Test

Subject:	Y9 <i>Standard</i> Mathematics	Name : (Class)	() <i>Sohn</i>
Assessment:	Broad-based Test		
Date of assessment:	8 th June, 2012		

- This task assesses Criteria A and C;
- Time allowed – *1 hour and 30 mins*;
- You must answer all the questions;
- Write your answers in the spaces provided;
- Show all of your working – not just the answer
- Scientific Calculator is allowed.

Criterion A		
Levels	Task-Specific Rubric	Official IB Descriptors
0	The student does not reach a standard described by any of the descriptors given below.	
1-2	Students are reasonably successful with the Part A questions only. Any errors here are relatively minor.	The student generally makes appropriate deductions when solving simple problems in familiar contexts.
3-4	Students are successful with Part A questions. The only errors in part B questions are minor.	The student generally makes appropriate deductions when solving more complex problems in familiar contexts.
5-6	Students are successful with Part A and B questions. The only errors in part C questions are minor.	The student generally makes appropriate deductions when solving challenging problems in a variety of familiar contexts.
7-8	Students are successful with Part A, B and C questions. The only errors in part D questions are minor.	The student consistently makes appropriate deductions when solving challenging problems in a variety of contexts including unfamiliar situations.

Criterion C		
Levels	Task-Specific Rubric	Official IB Descriptors
0	The student does not reach a standard described by any of the descriptors given below.	
1-2	Very little working is shown, and/or the steps shown are confusing. Only the most basic mathematical symbols are used with accuracy.	The student shows basic use of mathematical language and/or forms of mathematical representation. The lines of reasoning are difficult to follow .
3-4	The working shown is generally adequate. Only a few errors in symbols/terminology are evident. It is reasonably easy to follow a student's logic/reasoning.	The student shows sufficient use of mathematical language and forms of mathematical representation. The lines of reasoning are clear though not always logical or complete . The student moves between different forms of representation with some success .
5-6	There are very few, if any, errors in symbols/terminology. All steps in calculations are shown in their completeness. It is easy to follow all the student's logic/reasoning.	The student shows good use of mathematical language and forms of mathematical representation. The lines of reasoning are concise, logical and complete . The student moves effectively between different forms of representation.

Part A (Level 1-2 Questions)

1. Factorize the following

a. $x^2 - 16x$

Answer (a) $x(x-16)$

b. $x^2 - 16$

Answer (b) $(x+4)(x-4)$

c. $x^2 + 3x - 28$

$$\begin{array}{r} x \quad -4 \\ x \quad 7 \\ \hline -4x \quad +7x = 3x \end{array}$$

Answer (c) $(x-4)(x+7)$

2. Consider a set of data 11cm, 15cm, 19cm, 8cm, 9cm, 12cm, 13cm, 15cm, 17cm and 12cm.

- a. Find the mean of this set of data.

$$(11 + 15 + 19 + 8 + 9 + 12 + 13 + 15 + 17 + 12) / 10$$

Answer (a) 13.1 cm

- b. Find the median of this set of data.

$$8, 9, 11, 12, 12, 13, 15, 15, 17, 19$$

$$(12 + 13) / 2$$

Answer (b) 12.5

- c. Find the mode of this set of data.

Answer (c) $12 \text{ cm}, 15 \text{ cm}$

Part B (Level 3-4 Questions)

3. In Ivan's family, there are 8 members, including Ivan himself, his father, mother, grandmother, 2 elder brothers, 1 elder sister and 1 younger sister. If a person is chosen at random, find the probabilities of the following events happening.

a. Ivan's elder brother is chosen.

$$\frac{2}{8} = \frac{1}{4}$$

Answer (a) $\frac{1}{4}$

b. A male is chosen.

$$\frac{4}{8}$$

Answer (b) $\frac{1}{2}$

4.

- a. Show that $\cos^2 x - \sin^2 x = 2\cos^2 x - 1$

$$\begin{aligned} & \text{L.H.S.} \\ & \cos^2 x - (1 - \cos^2 x) \\ & = \cos^2 x - 1 + \cos^2 x \\ & = 2\cos^2 x - 1 \\ & = \text{R.H.S.} \end{aligned}$$

Answer (a) ~~.....~~

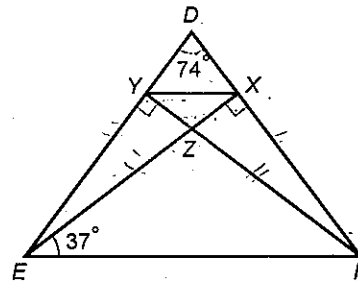
- b. If $\cos x = \frac{1}{5}$, find the value of $\cos^2 x - \sin^2 x$

$$\begin{aligned} & \cos^2 x - \sin^2 x \\ & = 2\cos^2 x - 1 \\ & = 2 \left(\frac{1}{5} \right)^2 - 1 \\ & = 2 \cdot \frac{1}{25} - 1 \\ & = \frac{2}{25} - 1 \\ & = -\frac{23}{25} \end{aligned}$$

Answer (b) $-\frac{23}{25}$

Part C (Level 5-6 Questions)

5. In the figure, DYE and DXF are straight lines. EX and FY are the altitudes of $\triangle DEF$ on DF and DE respectively, and they intersect at Z . $\angle EDF = 74^\circ$ and $\angle XEF = 37^\circ$.



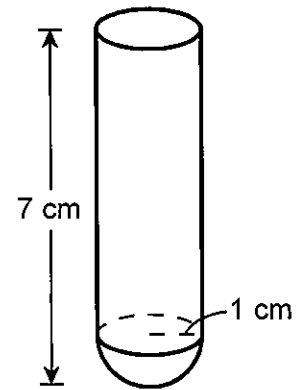
- a. Prove that $\triangle DEF$ and $\triangle ZEF$ are isosceles triangles.

$$\begin{aligned}\angle YZX &= 106^\circ \\ \angle YEZ &= 106^\circ - 90^\circ = 16^\circ \\ \angle DEF &= 16^\circ + 37^\circ = 53^\circ \\ \angle DFE &= 180^\circ - 53^\circ - 74^\circ = 53^\circ \\ \therefore \triangle DEF &\text{ is isosceles } \triangle \\ \angle XFE &= 106^\circ - 90^\circ = 16^\circ \\ \angle ZFE &= 53^\circ - 16^\circ = 37^\circ \\ \therefore \triangle ZFE &\text{ is isosceles } \triangle.\end{aligned}$$

- b. Prove that $EF \parallel YX$.

$$\begin{aligned}\triangle YEZ &\cong \triangle FXZ \text{ (RHS.)} \\ \therefore \triangle ZXY &\text{ is isosceles.} \\ \therefore \angle XYZ &= (180^\circ - 106^\circ) \div 2 \\ &= 37^\circ \\ &= \angle XFE \\ \therefore EF &\parallel YX \text{ (alt. } \angle\text{s equal.)}\end{aligned}$$

6. The figure shows a solid composed of a right cylinder and a hemisphere. The height of the solid is 7 cm and the base radius of the cylinder is 1 cm.



- a. Find the volume of the solid.

(Express your answers in terms of π .)

$$\begin{aligned} & \pi (1)^2 (6) + \frac{4}{3} \pi (1)^3 \div 2 \\ &= 6\pi + \frac{4}{3} \pi \div 2 \\ &= \frac{20\pi}{3} (\text{cm}^3) \end{aligned}$$

Answer

(a) $\frac{20\pi}{3} \text{ cm}^3$

- b. Find the total surface area of the solid.

(Express your answers in terms of π .)

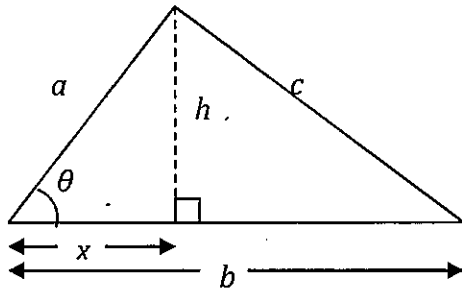
$$\begin{aligned} & 2\pi(1)(6) + 4\pi(1) \div 2 + \pi(1)^2 \\ &= 12\pi + 2\pi + \pi \\ &= 15\pi \end{aligned}$$

Answer

(b) $15\pi (\text{cm}^2)$

Part D (Level 7-8 Questions)

7. Given a triangle:



For questions a – d, write equations that:

a. relates: a , h , and x

$$a^2 = x^2 + h^2$$

Answer (a) $a^2 = x^2 + h^2$

b. relates: x , a and θ

$$\cos \theta = \frac{x}{a}$$

Answer (b) $\cos \theta = \frac{x}{a}$

c. expresses c^2 in terms of x , b and h .

$$c^2 = h^2 + (b-x)^2$$

Answer (c) $c^2 = h^2 + (b-x)^2$

d. Using equations above, show that $c^2 = a^2 + b^2 - 2ab \cos \theta$

$$\begin{aligned} c^2 &= h^2 + (b-x)^2 \\ &= a^2 - x^2 + (b-x)^2 \\ &= a^2 - x^2 + b^2 - 2xb + x^2 \\ &= a^2 + b^2 - 2xb \\ &= a^2 + b^2 - 2a \cos \theta b \\ &= a^2 + b^2 - 2ab \cos \theta \end{aligned}$$

8. Given the points A(2,R), B (1,1) and C (4,3) .

a. Find the distance between B and C

$$\sqrt{(1-4)^2 + (1-3)^2}$$

Answer (a) $\sqrt{13}$ units

b. Find the equation of the line passing through B and C

$$\frac{y-1}{x-1} = \frac{3-1}{4-1}$$

$$3(y-1) = 2(x-1)$$

$$3y - 3 = 2x - 2$$

$$-1 = 2x - 3y$$

Answer (b) $-1 = 2x - 3y$

c. If the line AC is \perp to BC, find the value of R

$$m_{BC} = \frac{2}{3}$$

$$m_{AC} = \frac{-3}{2}$$

$$\frac{3-R}{4-2} = \frac{-3}{2}$$

$$6 - 2R = -6$$

$$-2R = -12$$

Answer (c) $R = 6$

d. Find the $\angle ABC$

$$AC = \sqrt{(6-3)^2 + (2-4)^2}$$

$$= \sqrt{13}$$

Answer (d) 45°

--The End of Paper---